## CLAIMS

**What Is Claimed Is:**

1. A device comprising:

a geomagnetic sensor for sensing a heading and providing a corresponding first heading signal;

an angular velocity sensor for sensing motion and outputting a corresponding angular velocity signal;

a signal integrator communicatively coupled to the angular velocity sensor to receive the angular velocity signal and output a second heading signal; and

a processing unit communicatively coupled to the geomagnetic sensor and signal integrator, the processing unit configured to

receive an initial reference heading from the geomagnetic sensor,

generate a hybrid heading signal based on the initial reference heading and the second heading signal, and

blend the first heading signal with the hybrid heading signal at an adaptive time interval.

2. The device of claim 1 wherein the angular velocity signal corresponds to a relative heading.

3. The device of claim 1 wherein the adaptive time interval increases if a significant magnetic anomaly is deduced and decreases if the reliability of the magnetic sensor improves.

4. The device of claim 1 wherein the adaptive time interval at which the first signal from the geomagnetic sensor is blended with the hybrid signal depends upon indications as to whether the geomagnetic sensor is likely to be accurate.

5. The device of claim 4 changes in the overall magnitude of the earth's magnetic field are used as indications of the geomagnetic sensor's accuracy.

6. The device of claim 4 wherein changes in acceleration are used as an indication of the geomagnetic sensor's inaccuracy.

7. The device of claim 1 wherein the angular velocity sensor is calibrated by taking the output angular velocity signal as a zero offset value when the first heading signal from the geomagnetic sensor is substantially constant and the device is substantially motionless.

8. The device of claim 7 wherein the zero offset value gradually replaces a previous offset value.

9. The device of claim 1 wherein a gain value for the angular velocity sensor is calibrated by monitoring for constant readings from the geomagnetic sensor at two well-separated angles and comparing the difference between those angles and the integrated output of the angular velocity sensor.

10. The device of claim 9 wherein the gain value gradually replaces a previous gain value.

11. A method comprising:

sensing a heading of a body based on earth's magnetic field;

providing an initial heading based on the sensed heading;

sensing angular motion of the body with an angular rate sensor;

providing an angular rate signal based on the sensed angular motion;

integrating the angular rate signal to provide a second heading signal;

generating a hybrid heading signal based on the initial heading and the second heading signal;

providing a first heading signal based on the sensed heading; and

blending in the first heading signal with the hybrid heading signal at an adaptive time interval.

12. The method of claim 11 wherein the adaptive time interval increases if a significant magnetic anomaly is deduced and decreases if the reliability of the earth's magnetic field improves.

13. The method of claim 11 further comprising:

determining a new zero offset for the angular rate sensor when the first heading signal is substantially constant during a period of substantial immobility.

14. The method of claim 13 further comprising:

calibrating the angular rate sensor by gradually replacing previous zero offsets with the new zero offset.

15. The method of claim 11 further comprising:

determining a new gain value for the angular rate sensor by monitoring for constant readings from a geomagnetic sensor at two well-separated angles and comparing the difference between those angles and the second heading signal.

16. The method of claim 15 further comprising:

calibrating the angular rate sensor by gradually replacing the previous gain value with the new gain value.

17. A gyroscope-aided compass comprising:

geomagnetic sensing means for sensing a heading and providing a corresponding first heading signal;

angular velocity sensing means for sensing motion and outputting a corresponding angular velocity signal;

signal integrating means communicatively coupled to the angular velocity sensing means to receive the angular velocity signal and output a second heading signal; and

a processing means communicatively coupled to the geomagnetic sensing means and signal integrating means, the processing means configured to

receive an initial reference heading from the geomagnetic sensing means,

generate a hybrid heading signal based on the initial reference heading and the second heading signal, and

blend the first heading signal with the hybrid heading signal at an adaptive time interval.

18. The gyroscope-aided compass of claim 17 wherein the adaptive time interval increases if a significant magnetic anomaly is deduced and decreases if the reliability of the earth's magnetic field improves.

19. The gyroscope-aided compass of claim 17 further comprising:

calibration means for determining a new zero offset for the angular rate sensing means when the first heading signal is substantially constant during a period of substantial immobility, wherein the calibration means gradually replaces previous zero offsets with the new zero offset.

20. The gyroscope-aided compass of claim 17 further comprising:

calibration means for determining a new gain value for the angular rate sensing means by monitoring for constant readings from the geomagnetic sensing means at two well-separated angles and comparing the difference between those angles and the second heading signal.